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News Releases



Melissa Gilmore and Rebecca Laws send their responses to a question posed by physics instructor William McNairy.
Photo by Jim Wallace

Handheld Transmitters Connect Students and Teachers in Class

Faculty teaching in large classes get instant assessment on whether students understand material

Friday, Feb. 4, 2005 |

Students in a Duke pilot program are wielding handheld infrared transmitters that closely

resemble television remotes. But rather than using the gadgets to channel surf, they are pushing the transmitters' buttons to respond to teachers' questions posed during lectures.

The result of the new approach to student feedback, say the teachers, is a significantly enhanced educational process.

"Teaching a large class without a classroom response system is like driving with your eyes closed," said William McNairy, lecturer in physics at Duke and an expert on classroom response systems. "We don't drive cars that way, but it is how we teach, with eyes closed until a midterm and a final."

"The feedback from these systems enables students to learn better rather than just finding out at the end that they failed," said Sherryl Broverman, assistant professor of the practice in biology.

"Our pilot program made a believer of me," said Melissa Mills, associate dean for information science and technology for arts & sciences. "We'll provide a system for any faculty who want to use it. The time is right. Costs have come down, and we've made it easier to get started."

Mills said many faculty members had balked at spending class time handing out and collecting the transmitters, a long process in large classes because each student must use a specific transmitter. "This year we asked students to buy the transmitters at the computer store and bring them to class," Mills said. "The \$29 cost is low considering students can use the same transmitter as long as they are at Duke. There are \$20 rebates from some

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textbook publishers."

Duke is among some 300 universities using the proprietary Interwrite Personal Response System, according to GTCO CalComp, the manufacturer.

McNairy and Broverman use the classroom response system not only to gauge comprehension, but also to provide a refreshing break and stimulate discussion.

When the teacher poses a question, the students' transmitted responses are captured by one of the small receivers installed around the classroom. Each student can see the initials or number corresponding to his or her transmitter change color, showing the response has been received. When polling ends, the class sees a chart showing the percentage of students favoring each answer.

"When I just ask students if everybody understands something, there's not a sound out of 75 students," McNairy said. "But after class, five students ask me to go over something again. For them it's OK, but for the others, it's too late. If the classroom response system shows 70 percent of the class gets something right, I feel somewhat confident that they understand it. If it's 20 percent, I can spend more time on the topic."

Student responses are usually presented in the aggregate, cloaking individual answers to encourage participation. "In a class like mine on AIDS and other emerging diseases, with more than 300 students, not everyone is going to raise their hand," Broverman said. "I put up the response graph and say, 'If you voted for B, why didn't you choose C?' Students are more likely to speak up. The same six people used to speak over and over. This way I get to survey the whole class."

McNairy said the classroom response system can provide a welcome break in a long lecture. "When interest starts to drift, polling brings the energy level back up," McNairy said.

Most students like the classroom response system. "The days I don't ask questions, I have students bugging me about not having done it," McNairy said. "They want to have been polled. It's not to improve their grade. It's that they want to be asked."

Undergraduate Matt Emery appreciates the incentive to attend McNairy's physics class and the chance to improve grades. "Some kids don't like coming to class, but attending class most likely leads to better understanding of the material," Emery said. "Consistently attending class and answering the questions got us a solid 7 points on our final grade, just for participating. The system gives the professor a feel for how the class is learning,

and incorporating technology into a classroom full of techno-savvy 21st century kids is definitely a plus!"

Because some students dislike having attendance affect their grades, McNairy grades both with and without numbers from the classroom response system and uses the higher grade.

Mills advises against using the PRS system to take attendance.

"Students have been known to skip class and send their transmitters with friends," Mills said. "Gauging students' understanding of new material and fostering interactive, participatory class sessions seem to be the sweet spots of the system. Students say it makes the classes fun."

Support for peer instruction is another benefit provided by classroom response systems, said McNairy. "If 30 to 40 percent of your students have the right answer, you can have groups of students talk among themselves. When you poll again, you typically see an increase to 60 or 70 percent answering correctly."

Broverman said classroom response systems do have drawbacks, including increased preparation time for classes, and students sometimes forgetting their transmitters. "Students say, 'I want to get credit for being here but I forgot my clicker!'" said Broverman. "You can bury yourself in little notes saying John Smith was here without his clicker."

Broverman and McNairy said the classroom response system is worth the extra time and effort.

"You're not doing this to be lazy or to monitor attendance," McNairy said. "You do it because the payoffs are incredible."

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